Attorney Docket: 044182-0308760
Client Reference:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re PATENT APPLICATION of: STROM ET AL. — Confirmation Number: 2939

Application No.: 10/801,944 — Group Art Unit: 2829

Filed: March 15, 2004 — Examiner: PATEL, Paresh H.

Title: SYSTEM AND METHOD OF MEASURING PROBE FLOAT

Submitted electronically via EFS

REPLY BRIEF

Mail Stop APPEAL
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This paper is further to the Examiner's Answer mailed August 23, 2007, for which a reply brief is due October 23, 2007. Applicant claims small entity status, see 37 CFR 1.27. The Commissioner is authorized to charge any other required fee to Pillsbury Winthrop Shaw Pittman LLP's deposit account no. 03-3975 (order no. 044182-0308760).

THE EXAMINER IGNORES CLEAR CLAIM LIMITATIONS AND DISREGARDS THE INVENTION AS A WHOLE

In evaluating claims, all claim limitations must be considered and given weight. MPEP 2143.03. Moreover, it is improper to distill an invention down to a hypothetical "gist" or "thrust" of the invention. Rather, the invention as a whole must be considered. MPEP 2141.02. Simply put, the rules do not allow an Examiner to just pick and choose words from prior art references and rearrange those words to conform with the claim language.

Here, the claims require many elements, which taken as a whole, clearly provide many patentable distinctions over the cited prior art. U.S. Patent No. 6,870,382 to Harris ("Harris"), does not teach methods for calculating probe float. Nevertheless, the Examiner excises choice phrases and sentences from Harris to present in arrangements that superficially appear to relate to the claimed inventions. In response, Applicants have availed of the opportunity to reply in order to provide context to the citations and to submit the attached Declaration of John Strom, inventor and one skilled in the relevant art. Mr. Strom concurs that Harris does not teach the calculation of probe float as required by the claims of the subject Application.

Each of the claims under appeal requires, *inter alia*, acquiring a free-hanging planarity measurement, obtaining a first electrical contact planarity measurement, and calculating probe float using results of said acquiring and said obtaining. Harris does not teach calculating probe float and does not even teach acquiring a free-hanging planarity measurement.

The Examiner alleges, without support from Harris that Harris "is not silent regarding probe float calculation, because Harris discloses the z position difference of the probe tip between the free hanging state (probe tip close to a mechanical contact state) and an electrical contact state." The Examiner continues: "Harris uses optical method to determine when probe tip is close to mechanical contact of a contact surface." The Examiner concludes that these disclosures teach acquiring a free-hanging planarity measurements. Applicants disagree. Applicants respectfully submit that an alleged inclusion in Harris of an identification of the existence of probe float cannot reasonably be said to anticipate a method for resolving a problem associated with probe float. Simply put, identifying a feature is not equivalent to resolving a problem with the feature.

The claims under appeal are directed to a method for, and a computer readable medium encoded for, calculating probe float. Probe float is well-described in the Specification and Drawings of the subject Application. *See* Declaration of Inventor Strom.

Claim 1 of the subject Application requires acquiring a free-hanging planarity measurement and calculating probe float based in part on the free-hanging planarity measurement. Harris teaches neither step. Harris is expressly limited to the detection of the point of electrical contact, stating that "it is more desirable to measure the point of electrical contact than the point of mechanical contact." *See* Harris, paragraph spanning cols. 5-6 in its entirety. At most, Harris might be said to teach methods of measuring point of electrical contact for probe pins as a means to calculating electrical planarity. Harris does not teach any measurement of free-hanging planarity and Harris dismisses the use of optical systems for measuring planarity. Since probe float necessarily involves states in which electrical contact cannot be made through electrical measurement, Harris inherently disassociates itself from methods of measuring or calculating probe float. Attention is drawn to the following recitation from Harris:

> Some probe companies offer optical solutions, which can report the z positions where mechanical contact occurs for each probe tip. *However, optical solutions are very slow and thus not feasible in a production environment. Also, the optical measurements do not report where electrical contact occurs. This is especially important for vertical, piston-configured probe cards, where the probe needles or pins float and do not make electrical contact until the probe pin is sufficiently pressed against the pad.* Also, with cantilever style probe needles 48, as shown in FIG. 1, the point of electrical contact (z-location of probe card 32 where electrical continuity exists between a probe needle 50 and a selected surface) typically differs from the point of mechanical contact (z-location of probe card where probe tip 48 first physically contacts the selected surface). The electrical contact occurs when the probe tip 48 penetrates or scratches through the resistive layer of oxide that tends to build up on the bond pads or bumped pads as the cantilever probe needle 50 flexes and gradually presses harder against the pad. The difference between the z position of electrical contact and the z position of mechanical contact for a cantil ever-style probe needle is significant because it is nearly equal to the typical parallelism tolerance for the probe card. The electrical contact is also more important because it is the electrical contact between the probe tips 48 and the die pads that is needed to test the dies, rather than mere mechanical contact. Thus, it is more desirable to measure the point of electrical contact than the point of mechanical contact.

Harris, paragraph spanning cols. 5-6, with added emphasis. In this passage, Harris teaches exclusive reliance on planarity measured through electrical contact detection and references a form of probe float as a reason for such reliance. No other teaching, description or suggestion in Harris provides a means for measuring free-hanging planarity or suggests the use of a free-hanging planarity measurement for any purpose. Harris is solely interested in measuring point of electrical contact. Therefore, the Examiner's assertions that Harris teaches each and every element of the claims, arranged as they are in the claims are unreasonably speculative and are contradicted by Harris itself.

In the passage reproduced above, Harris describes optical measurement systems dismissively, stating that such systems are very slow and infeasible in production environments. Again, Harris is concerned only with planarity at the point of contact and rejects methods of measurements that could fail to provide actual electrical contact due to, for example, the presence of a resistive oxide. *Id*. When presented with such explicit citation, the Examiner protests that Harris does not dismiss optical planarity measurement systems and cites the use of an optical method in Harris in support. However, the supporting passage containing the short sentence cited by the Examiner states in full:

> The wafer chuck 44 is moved in the z direction toward the probe card 32 (and hence toward the probe tip array 48) in incremental steps as the die gets close to mechanically contacting at least one probe tip 48 or after the first mechanical contact is made (e.g., this could be determined using optical method). The die is moved in one micron increments towards the probe tip array 48, for example. The spacing between increments may vary among increments, or the spacing between each increment may be the same. Also, the spacing may be another distance other than one micron.

Harris. col. 6, lines 28-56. Thus, the passage when read in its entirety teaches the use of an "optical method" to determine when a first probe tip is close enough to a die to begin movement in one micron steps. This description does not support the rejection of claim 1.

Furthermore, Harris cannot be said to teach calculating probe float as required in claim 1. Nothing in Harris teaches how a visual inspection sufficient for a "close enough" measurement would produce a free hanging planarity measurement. Harris can only determine planarity based on sequenced electrical connection of probe tips. Claim 1 requires calculating probe float based

on electrical planarity and free-hanging planarity. Since Harris does not teach both planarity measurements, the rejection of claim 1 is improper.

Claim 2 requires computing a difference between results of first electrical contact planarity measurement and free-hanging planarity measurement. Since Harris does not teach acquiring or obtaining both of these planarities, Harris cannot teach computing the required difference. Applicant notes that the Examiner references an offer to amend claims to replace calculating with subtracting in order to obtain potential allowance of the claims. It will be appreciated that calculating a difference between components typically involves subtraction of the different components. Consequently, Applicants submit that acceptance of the Examiner's offer could not have reasonably been expected to yield a positive outcome while claim 2 remained under rejection.

Claim 3 requires steps not found in Harris. As shown above, Harris does not teach free-hanging planarity measurement. Harris relies entirely on obtaining a point of electrical contact and cannot determine the transitions between free-hanging, mechanical contact and electrical contact. Harris merely allows detection of transition between electrical contact and electrical non-contact.

Claim 4 further requires obtaining free-hanging measurements until all probe tips have been assigned a free-hanging planarity value. Harris offers no teaching or suggestion of such assignment of values to each probe.

Claim 6 requires the use of an optical system to acquire a reference planarity measurement. Harris does not teach a reference planarity measurement and Harris uses an "optical method" only to determine closeness of a probe array to a die.

Claim 7 requires the use of an optical system to identify new free-hanging probes. As shown above, Harris uses an "optical method" only to determine closeness of a probe array to a die. Harris does not teach identification of a new free hanging probe.

Regarding claim 9, see arguments for claim 1, above. Regarding claim 10, see arguments for claim 2, above. Regarding claim 12, see arguments for claim 3, above. Regarding claim 13, see arguments for claim 4, above. Regarding claim 15, see arguments for claim 6, above. Regarding claim 16, see arguments for claim 7, above. Regarding claims 19-20, see arguments for claim 1, above.

CONCLUSION

For the foregoing reasons, Appellants respectfully request that all the pending claims be deemed allowable by this honorable Board.

Respectfully submitted,
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